

11/21/00  
6/7/02

IN THE CLAIMS

Please amend the claims as follows:

1. (currently amended) A system for determining a guaranteed productivity customer support agreement for a customer, comprising:
- at least one machine sensor adapted to provide at least one machine sensor signal ~~indicative of the~~ representing a work indicator of performed by the a machine;
  - at least one computer adapted to
    - receive the sensor signal,
    - calculate ~~the~~ a productivity of the machine, and
    - select a the ~~guaranteed productivity~~ customer support agreement in response to the productivity.
2. (original) The system of claim 1, wherein the computer is adapted to determine whether the productivity of the machine is deteriorating and provide a productivity deterioration warning notice signal in response to determining the productivity of the machine is deteriorating.
3. (currently amended) A system for providing at least one work machine to a customer, comprising:
- at least one machine sensor adapted to provide at least one machine sensor signal indicative of ~~the~~ an operation performed by the machine, ~~the~~ a payload handled by the machine and ~~the~~ an amount of fuel consumed by the machine; and
  - a computer adapted to
    - receive the sensor signal,
    - calculate ~~the~~ a productivity of the machine,
    - select and generate a ~~guaranteed productivity~~ customer support agreement in response to the productivity of the machine,
    - monitor the productivity of the machine,

determine whether the productivity of the machine is deteriorating, and provide a productivity deterioration warning notice signal in response to determining the productivity of the machine is deteriorating.

4. (original) The system of claim 3, wherein the machine sensor includes at least one operation sensor adapted to provide at least one operating sensor signal indicative of the operation performed by the machine, at least one payload sensor adapted to provide at least one payload sensor signal indicative of the payload handled by the machine and at least one fuel sensor adapted to provide at least one fuel consumption sensor signal indicative of the amount of fuel consumed by the machine.

5. (currently amended) The system of claim 4, including at least one data storage device adapted to store on a storage medium information including empirical data, values representing the sensor signals and normalized operator productivity data for at least one work cycle and wherein the computer is adapted to compare the sensor signals to the empirical data to determine a work cycle performed by the machine, determine a skill level of ~~the~~ an operator and provide a skill level notice signal, the skill level of the operator being determined by comparing the productivity of the machine with the normalized operator productivity data for the work cycle and calculate ~~the~~ a change in the productivity of the machine and a skill level of the operator, the data storage device being adapted to store ~~the~~ a change in the productivity of the machine and the skill level of the operator.

6. (currently amended) A system for providing at least one work machine controlled by at least one operator to a customer, comprising:

at least one operation sensor adapted to provide at least one operating sensor signal indicative of ~~the~~ an operation performed by the machine;

at least one payload sensor adapted to provide at least one payload sensor signal indicative of ~~the~~ a payload handled by the machine;

at least one fuel sensor adapted to provide at least one fuel consumption sensor signal indicative of ~~the~~ an amount of fuel consumed by the machine;

at least one data storage device adapted to store on a storage medium information including empirical data, values representing the sensor signals, normalized operator productivity data for at least one work cycle, normalized expected improvement in skill level data for at least one work cycle and at least one ~~guaranteed productivity~~ customer support agreement having at least one minimum productivity limit and corresponding price;

a computer including a CPU adapted to

receive the sensor signals,

compare the sensor signals to the empirical data to determine a the work cycle performed by the machine,

calculate ~~the~~ a productivity of the machine and provide a productivity notice signal, the productivity being a function of ~~an~~ the amount of fuel consumed and at least one of a the payload handled by the machine and ~~an~~ the operation performed by the machine,

determine a skill level of the operator and provide a skill level notice signal, the skill level of the operator being determined by comparing the productivity of the machine with the normalized operator productivity data for the work cycle,

select and generate the ~~guaranteed productivity~~ customer support agreement establishing at least one minimum productivity limit and corresponding price in response to the skill level,

monitor the machine,

continuously calculate the productivity of the machine and determine the skill level of the operator,

calculate ~~the~~ a change in the productivity of the machine and the skill level of the operator, the data storage device being adapted to store the change in the productivity of the machine and a skill level of the operator,

determine whether the productivity of the machine is deteriorating as a function of at least one of the change in the productivity of the machine, the change in the skill level of the operator and the normalized expected improvement in skill level data,

provide a productivity deterioration warning notice signal in response to determining the productivity of the machine is deteriorating,

provide a service notice signal in response to the step of determining whether the productivity of the machine is deteriorating,

provide an agreement warning notice signal in response to the step of determining whether the productivity of the machine is deteriorating and considering the limit,

generate at least one message record,

the message record including at least one of the signals and the notice signals, and

the data storage device being adapted to store values representing the message record; and

at least one communication device adapted to receive the message record and provide the message record to at least one of the operator, a service organization, the customer and an owner of the machine.

7. (currently amended) A method of determining a ~~guaranteed~~ customer support agreement for a customer, the method comprising the steps of:  
determining ~~the~~ a productivity of the machine; and  
generating a ~~guaranteed productivity~~ customer support agreement establishing at least one minimum productivity limit.

8. (original) The method of claim 7, wherein an operator operates the machine and including the step of determining a skill level of the operator.

9. (original) The method of claim 8, including the steps of determining whether the productivity of the machine is deteriorating and communicating a productivity deterioration warning notice to at least one of the operator, a service organization, the customer and an owner of the machine.

10. (currently amended) A method of providing at least one work machine to a customer, the method comprising the steps of:

determining ~~the~~ a productivity of the machine, the productivity being at least a function of a time period, a fuel consumed and at least one of a payload handled by the machine and an operation performed by the machine;

determining a skill level of ~~the~~ an operator;

generating a ~~guaranteed productivity~~ customer support agreement establishing at least one minimum productivity limit and a corresponding price in response to the skill level;

determining whether the productivity of the machine is deteriorating; and

communicating a productivity deterioration warning notice to at least one of the operator, a service organization, the customer and an owner of the machine.

11. (original) The method of claim 10, including the steps of monitoring the operation of the machine and determining a work cycle performed by the machine.

12. (currently amended) The method of claim 11, wherein the machine is operated by ~~an~~ the operator and including the steps of comparing the productivity of the machine with a normalized operator productivity data for the work cycle and determining a ~~the~~ skill level of the operator in response to the step of comparing the productivity of the machine with the productivity data.

13. (currently amended) The method of claim 12, including the steps of performing comparisons of the productivity of the machine with the productivity data and determining ~~the~~ a change in the skill level of the operator in response to the step of performing subsequent comparisons of the productivity of the machine with the productivity data.

14. (currently amended) The method of claim 13, including the step of providing an incentive to the operator for at least achieving a predetermined change in the

skill level, ~~such~~ the predetermined change in skill level being determined by considering a normalized expected improvement in the skill level, and the incentive being at least one of a reward, penalty, compensation, and failure to impose at least one of a reward, penalty and compensation.

15. (currently amended) The method of claim 13, including the steps of determining a productivity deterioration warning notice in response to performing subsequent comparisons of the productivity of the machine with the productivity data and considering the normalized expected improvement in the skill level, determining a service notice in response to the step of determining whether the productivity of the machine is deteriorating and determining an agreement warning in response to the step of determining whether the productivity of the machine is deteriorating and considering the limit.

AI  
16. (currently amended) The method of claim 15, including the step of generating at least one message record and including in the message record a signal indicative of at least one of the productivity, the skill level, the service notice, the agreement warning, the productivity deterioration warning notice, the time period, the fuel consumed, the payload handled by the machine and the operation performed by the work machine.

17. (currently amended) A method of providing at least one work machine controlled by at least one operator to a customer, the method comprising the steps of:

monitoring ~~the~~ an operation of the machine;

determining a work cycle performed by the machine;

determining ~~the~~ a productivity of the machine, the productivity being at least a function of a time period, a fuel consumed and at least one of a payload handled by the machine and ~~an~~ the operation performed by the machine;

comparing the productivity of the machine with normalized operator productivity data for the work cycle;

determining a skill level of the operator in response to the step of comparing the productivity of the machine with the productivity data;

generating a ~~guaranteed productivity~~ customer support agreement establishing at least one minimum productivity limit and corresponding price in response to the skill level;

monitoring the machine;

performing subsequent comparisons of the productivity of the machine with the productivity data;

determining ~~the~~ a change in the skill level of the operator in response to the step of performing subsequent comparisons of the productivity of the machine with the productivity data;

providing an incentive to the operator for at least achieving a predetermined change in the skill level, such predetermined change in the skill level being determined by considering a normalized expected improvement in the skill level, and the incentive being at least one of a reward, penalty, compensation, and failure to impose at least one of a reward, penalty and compensation;

determining whether the productivity of the machine is deteriorating and determining a productivity deterioration warning notice in response to performing subsequent comparisons of the productivity of the machine with the productivity data and considering the normalized expected improvement in the skill level;

determining a service notice in response to the step of determining whether the productivity of the machine is deteriorating;

determining an agreement warning in response to the step of determining whether the productivity of the machine is deteriorating and considering the limit;

generating at least one message record;

including in the message record a signal indicative of at least one of the productivity, the skill level, the service notice, the agreement warning, the productivity deterioration warning notice, the time period, the fuel consumed, the payload handled by the machine and the operation performed by the work machine; and

communicating the message record to at least one of the operator, a service organization, the customer and an owner of the machine.

18. (currently amended) A work machine adapted to be controlled by an operator and for acting upon a load through a plurality of work cycles, comprising:  
a frame;

a plurality of ground engaging devices supporting the frame;

an operator compartment supported by the ground engaging devices;

an implement having a linkage for operably connecting the implement to the frame;

an engine operably coupled to the ground engaging devices; and

a system for determining a ~~guaranteed~~ productivity customer support agreement for a customer, including:

at least one machine sensor adapted to provide at least one machine sensor signal ~~indicative of the~~ representing a work indicator of ~~performed by the machine;~~

at least one computer adapted to

receive the sensor signal,

calculate ~~the a~~ productivity of the machine, and

select a ~~the guaranteed productivity~~ customer support agreement in response to the productivity.

19. (original) The work machine of claim 18, wherein the computer is adapted to determine whether the productivity of the machine is deteriorating and provide a productivity deterioration warning notice signal in response to determining the productivity of the machine is deteriorating.

20. (canceled)

21. (canceled)

22. (canceled)

23. (currently amended) A system for measuring operator productivity of at least one work machine for a customer, comprising:



at least one machine sensor adapted to provide at least one machine sensor signal indicative of ~~the~~ an operation performed by the machine, ~~the~~ a payload handled by the machine and ~~the~~ an amount of fuel consumed by the machine;

at least one data storage device adapted to store information on a storage medium;

a computer adapted to

receive the sensor signals,

calculate ~~the~~ a productivity of the machine, the productivity being a function of ~~an~~ the amount of fuel consumed and at least one of a payload handled by the machine and an operation performed by the machine,

calculate ~~the~~ a change in the productivity of the machine, the data storage device being adapted to store the change in the productivity of the machine; ~~and~~

determine whether the productivity of the machine is deteriorating; ~~;~~

and

wherein the information includes empirical data, values representing the sensor signals, normalized operator productivity data for at least one work cycle and the computer is adapted to compare the sensor signals to the empirical data to determine the work cycle performed by the machine, determine a skill level of an operator and provide a skill level notice signal, the skill level of the operator being determined by comparing the productivity of the machine with the normalized operator productivity data for the work cycle, calculate a change in the skill level of the operator and determine whether the productivity of the machine is deteriorating as a function of at least one of the change in the productivity of the machine, the change in the skill level of the operator and the normalized expected improvement in skill level.

24. (original) The system of claim 23, wherein the machine sensor includes at least one operation sensor adapted to provide at least one operating sensor signal indicative of the operation performed by the machine, at least one payload sensor adapted to provide at least one payload sensor signal indicative of the payload handled by the machine

and at least one fuel sensor adapted to provide at least one fuel consumption sensor signal indicative of the amount of fuel consumed by the machine.

25. (canceled),

26. (currently amended) A system for measuring operator productivity of at least one work machine for a customer, comprising:

at least one machine sensor adapted to provide at least one machine sensor signal indicative of an operation performed by the machine, a payload handled by the machine and an amount of fuel consumed by the machine;

at least one data storage device adapted to store information on a storage medium;

a computer adapted to

receive the sensor signals,

calculate a productivity of the machine, the productivity being a function of the amount of fuel consumed and at least one of a payload handled by the machine and an operation performed by the machine,

calculate a change in the productivity of the machine, the data storage device being adapted to store the change in the productivity of the machine;

determine whether the productivity of the machine is deteriorating; and

~~The system of claim 25~~, wherein the computer is adapted to provide a productivity deterioration warning notice signal in response to determining the productivity of the machine is deteriorating and generate at least one message record including the notice signal, the data storage device is adapted to store values representing the message record and at least one communication device is adapted to receive the message record and provide the message record to at least one of the operator, a service organization, the customer and an owner of the machine.

27. (currently amended) A method of providing incentives to an operator of a work machine, the method comprising the steps of:

determining a work cycle performed by the machine;

determining ~~the~~ a productivity of the machine;

comparing the productivity of the machine with a normalized operator productivity data for the work cycle;

determining a skill level of the operator in response to the step of comparing the productivity of the machine with the productivity data;

determining ~~the~~ a change in the skill level of the operator in response to comparing the productivity of the machine with the productivity data; and

providing ~~an~~ the incentive to the operator for at least achieving a predetermined change in the skill level.

28. (original) The method of claim 27, including the steps of generating at least one message record including a signal indicative of the skill level and communicating the message record to at least one of the operator, a service organization, a customer and an owner of the machine

29. (currently amended) A method of providing incentives to an operator of a work machine, the method comprising the steps of:

determining a work cycle performed by the machine;

determining ~~the~~ a productivity of the machine, the productivity being at least a function of a time period, a an amount of fuel consumed and at least one of a payload handled by the machine and an operation performed by the machine;

comparing the productivity of the machine with a normalized operator productivity data for the work cycle;

determining a skill level of the operator in response to the step of comparing the productivity of the machine with the productivity data;

determining ~~the~~ a change in the skill level of the operator in response to comparing the productivity of the machine with the productivity data;

providing ~~an~~ the incentive to the operator for at least achieving a predetermined change in the skill level, such predetermined change in the skill level being determined by considering a normalized expected improvement in the skill level, and the

incentive being at least one of a reward, penalty, compensation, and failure to impose at least one of a reward, penalty and compensation;

determining whether the productivity of the machine is deteriorating and determining a productivity deterioration warning notice in response to performing subsequent comparisons of the productivity of the machine with the productivity data and considering the normalized expected improvement in the skill level;

generating at least one message record including a signal indicative of the skill level; and

communicating the message record to at least one of the operator, a service organization, a customer and an owner of the machine.

30. (currently amended) A system for determining when a work machine needs service, comprising:

at least one machine sensor adapted to provide at least one machine sensor signal indicative of ~~the~~ an operation performed by the machine, ~~the~~ a payload handled by the machine and ~~the~~ an amount of fuel consumed by the machine; and

a computer adapted to receive the sensor signals, calculate ~~the~~ a productivity of the machine, determine a skill level of ~~the~~ an operator, calculate ~~the~~ a change in the productivity of the machine and the skill level of the operator, determine whether the productivity of the machine is deteriorating and provide a service notice signal in response to the step of determining whether the productivity of the machine is deteriorating.

31. (currently amended) The system of claim 30, wherein the determination of whether the productivity of the machine is deteriorating is determined as a function of at least one of the change in the productivity of the machine, the change in the skill level of the operator and ~~the~~ a normalized expected improvement in skill level data.

32. (currently amended) The system of claim 30, wherein the computer is adapted to generate at least one message record, the message record including the service notice signal and including at least one communication device adapted to receive the message

record and provide the message record to at least one of the operator, a service organization, ~~the~~ a customer and an owner of the machine.

33. (currently amended) A system for determining when a work machine needs service, comprising:

at least one machine sensor adapted to provide at least one machine sensor signal indicative of ~~the~~ an operation performed by the machine, ~~the~~ a payload handled by the machine and ~~the~~ an amount of fuel consumed by the machine; and

at least one data storage device adapted to store on a storage medium information including normalized operator productivity data for at least one work cycle and normalized expected improvement in skill level data;

a computer adapted to

receive the sensor signals,

calculate ~~the~~ a productivity of the machine,

determine a skill level of ~~the~~ an operator, the skill level of the operator being determined by comparing the productivity of the machine with the normalized operator productivity data for the work cycle,

calculate ~~the~~ a change in the productivity of the machine and the skill level of the operator,

determine whether the productivity of the machine is deteriorating as a function of at least one of the change in the productivity of the machine, the change in the skill level of the operator and the normalized expected improvement in the skill level data,

provide a service notice signal in response to the step of determining whether the productivity of the machine is deteriorating,

generate at least one message record,

the message record including the service notice signal; and

at least one communication device adapted to receive the message record and provide the message record to at least one of the operator, a service organization, ~~the~~ a customer and an owner of the machine.

34. (currently amended) The system of claim 33, wherein the productivity is a function of ~~an~~ the amount of fuel consumed and at least one of a the payload handled by the machine and ~~an~~ the operation performed by the machine.

35. (currently amended) A work machine adapted to be controlled by an operator and for acting upon a load through a plurality of work cycles, comprising:  
a frame;

a plurality of ground engaging devices supporting the frame;

an operator compartment supported by the ground engaging devices;

an implement having a linkage for operably connecting the implement to the frame;

an engine operably coupled to the ground engaging devices; and

A  
a system for determining fees to be paid by a customer that are based on machine productivity, including:

at least one machine sensor adapted to provide at least one machine sensor signal indicative of ~~the~~ an operation performed by the machine, ~~the~~ a payload handled by the machine and ~~the~~ an amount of fuel consumed by the machine; and

a computer adapted to receive the sensor signals, calculate ~~the~~ a productivity of the machine, determine a skill level of ~~an~~ the operator of the machine, the skill level of the operator being determined by comparing the productivity of the machine with ~~the~~ a normalized operator productivity data for the work cycle, and select an agreement establishing a price in response to the skill level.

36. (currently amended) The work machine of claim 35, wherein the productivity is a function of ~~an~~ the amount of fuel consumed and at least one of a the payload handled by the machine and ~~an~~ the operation performed by the machine.

37. (currently amended) The work machine of claim 35, wherein the agreement establishes at least one minimum productivity limit and the corresponding price.

38. (currently amended) The work machine of claim 35, including at least one communication device adapted to receive the price and provide the price to at least one of the operator, a service organization, the customer and an owner of the machine.

39. (currently amended) A work machine adapted to be controlled by an operator and for acting upon a load through a plurality of work cycles, comprising:

a frame;

a plurality of ground engaging devices supporting the frame;

an operator compartment supported by the ground engaging devices;

an implement having a linkage for operably connecting the implement to the frame;

an engine operably coupled to the ground engaging devices; and

a system for determining when a the work machine needs service, including:

at least one machine sensor adapted to provide at least one machine sensor signal indicative of ~~the~~ an operation performed by the machine, ~~the~~ payload handled by the machine and ~~the~~ amount of fuel consumed by the machine; and

A  
a computer adapted to receive the sensor signals, calculate ~~the~~ productivity of the machine, determine a skill level of the operator, calculate ~~the~~ change in the productivity of the machine and skill level of the operator, determine whether the productivity of the machine is deteriorating and provide a service notice signal in response to the step of determining whether the productivity of the machine is deteriorating.

40. (currently amended) The work machine of claim 39, wherein the determination of whether the productivity of the machine is deteriorating is determined as a function of at least one of the change in the productivity of the machine, the change in the skill level of the operator and ~~the~~ a normalized expected improvement in skill level data.

41. (currently amended) The work machine of claim 39, wherein the computer is adapted to generate at least one message record, the message record including the service notice signal and including at least one communication device adapted to receive the message record and provide the message record to at least one of the operator, a service organization, ~~the~~ a customer and an owner of the machine.

42. (currently amended) A system for determining fees to be paid by a customer that are based on machine productivity, comprising:

at least one machine sensor adapted to provide at least one machine sensor signal indicative of ~~the~~ an operation performed by ~~the~~ a machine, ~~the~~ a payload handled by the machine and ~~the~~ an amount of fuel consumed by the machine; and

a computer adapted to receive the sensor signals, calculate ~~the~~ a productivity of the machine, determine a skill level of an operator of the machine, the skill level of the operator being determined by comparing the productivity of the machine with ~~the~~ a normalized operator productivity data for ~~the~~ a work cycle, and select an agreement establishing a price in response to the skill level.

AM  
43. (currently amended) The system of claim 42, wherein the productivity is a function of ~~an~~ the amount of fuel consumed and at least one of a the payload handled by the machine and ~~an~~ the operation performed by the machine.

44. (currently amended) The system of claim 42, wherein the agreement establishes at least one minimum productivity limit and the corresponding price.

45. (original) The system of claim 42, including at least one communication device adapted to receive the price and provide the price to at least one of the operator, a service organization, the customer and an owner of the machine.

---